

ABSTRACT OF THE DISCLOSURE

A method for collecting optical data at two morphologically similar, substantially non-overlapping, and preferably adjacent, areas on the surface of a tissue, while the temperature in each area is being maintained or modulated according to a temperature program. The optical data obtained are inserted into a mathematical relationship, e.g., an algorithm, that can be used to predict a disease state (such as the diabetes mellitus disease state) or the concentration of an analyte for indicating a physical condition (such as blood glucose level). This invention can be used to differentiate between disease status, such as, for example, diabetic and non-diabetic. The method involves the generation of a calibration (or training) set that utilizes the relationship between optical signals emanating from the skin under different thermal stimuli and disease status, e.g., diabetic status, established clinically. This calibration set can be used to predict the disease state of other subjects. Structural changes, as well as circulatory changes, due to a disease state are determined at two morphologically similar, but substantially non-overlapping areas on the surface of human tissue, e.g., the skin of a forearm, with each area being subjected to different temperature modulation programs. In addition to determination of a disease state, this invention can also be used to determine the concentration of an analyte in the tissues. This invention also provides an apparatus for the determination of a disease state, such as diabetes, or concentration of an analyte, such as blood glucose level, by the method of this invention.